Environmental Health in the US-Mexico Border Region
FY 2006 End-of-Year Report

PROJECT ACCOMPLISHMENTS: The primary objectives of this project are to develop a bi-national, web-based geographic information system (GIS) containing natural resource data that can be used to further our understanding of the links between the condition of the physical environment and environmental and human health issues (USGS 2004a). The web-based Internet Mapping Service (IMS) serves two functions: first, it provides a geospatial interface loaded with tools that allow the manipulation of spatial data; and second, it serves as a data portal allowing users to integrate the datasets into their own analyses. The second objective is to develop collaborative partnerships through which we can apply the border GIS and IMS to address environmental health issues.

Three primary tasks were identified in our FY2006 Work Plan. First, we would establish a border-wide base map on the IMS using a medium-resolution basic geospatial framework including satellite imagery and digital elevation models with the locations of the major population centers. This would provide the platform upon which to subsequently overlay more comprehensive datasets. Second, we would add specific, local-level datasets such as high resolution aerial photos, land use and land cover hydrography, water quality, etc. in the remaining sub-areas (not previously covered) in Texas and the adjoining Mexican States of Chihuahua, Coahuila, and Nuevo León. Bi-national seamless integration methodologies developed in the Lower Rio Grande Pilot would be used to build these integrated datasets. Finally, the project would continue to seek opportunities for integration with existing and future USGS programs and to develop collaborative partnerships that would use the border GIS and IMS.

1.) Specific accomplishments in FY 2006 pursuant to these objectives include:

The Border Environmental Health Initiative (BEHI) IMS and GIS were updated to encompass the entire border by integrating and displaying regional datasets from San Diego to Brownsville. These include LANDSAT mosaic, SRTM shaded relief, binational land use and land cover, international, state, and county/municipal boundaries, major cities, low and medium resolution transportation and hydrography. Higher resolution binational datasets are being integrated for display on the Internet Map Service. These include the geographic names, contaminants in biota, potential sources of contaminants, and high resolution transportation and hydrography. New 2005 digital orthophotos were uploaded for the Texas portion of the border. The Texas colonias dataset is currently being updated for more accurate colonias boundaries, infrastructure availability, access to health care, schools, and paved roads. The entire web site is being reviewed internally and by the Mexican Instituto Nacional de Estadística, Geografía, e Informática (INEGI) for consistency and accuracy of data presentation.

The main web page was modified to accommodate the new USGS web page standards. The masthead was up-dated to reflect Border-wide coverage.

Continued to work effectively and productively with INEGI through 1) data layer exchanges and free access; 2) officially obtaining permission to distribute to the public the binational land use and land cover datasets.

Co-sponsored the USGS-SCERP (Southwest Environmental Resources and Policy) U.S.-Mexico Border GIS Summit in El Paso on April 10-12th. Over 100 invited attendees from both US and Mexico, including USGS Associate Director of Geography, Barb Ryan, and INEGI Director of Geography, Mario Reyes Ibarra, and Gov. Gerringer (Wyoming). A portion of the conference was dedicated to evaluating the design and effectiveness of the USGS Border Environmental Health binational GIS and how the BEHI could be a model or integral to developing a border-wide GIS that would provide public access to binational datasets beyond the scope of the BEHI. Subsequently, acting director Pat Leahy signed a Memorandum of Understanding with SCERP to lay a foundation for cooperative work in the western half of the border.

Production of a new fact sheet in both English and Spanish entitled: Interdisciplinary Science in Support of Environmental Health along the United States-Mexico Border. This fact sheet has a permanent URL at http://pubs.usgs.gov/fs/2006/3054/.

Supported production of the following reports and research products:

1) a published report on aerial gamma-ray survey for parts of Cameron, Hidalgo, and Willacy Counties, Texas: U.S. Geological Survey Open-File Report 2005-1231, internet only. (http://pubs.usgs.gov/of/2005/1231);

2) a published geologic map of the pilot area in southernmost Texas and parts of Tamaulipas and Nuevo Leon, Mexico: U.S. Geological Survey Open-File Report, 1:250,000-scale. (http://pubs.usgs.gov/of/2005/1409);

3) a published report on radon in soils in parts of Cameron, Hidalgo, and Wilacy Counties, Texas: U.S. Geological Survey Open-File Report 2005-1423 (http://pubs.usgs.gov/of/2005/1423);

4) Geologic Mapping Research: a) continued preparation of Version 2 of the geologic dataset for the pilot area using newly developed geologic mapping methodologies. Version 2 includes new geologic interpretations important in defining possible links of geology to human health and, when published, will replace Version 1 geologic map on IMS website. The map dataset will be published as a U.S. Geological Survey Open-File Report; b) preparation of a 1:5,000,000-scale seamless geologic map of the entire US-Mexico Border region and adjacent areas. Map format will be a geo-referenced image that will be posted in the static map library on the BEHI ArcIMS web site. Map image is from: Reed, John, C., Jr., Wheeler, John, O., and Tucholke, Brian, E., 2005, Geologic Map of North America: Geological Society of America Continental Scale Map CSM001, 1:5,000,000-scale; and c) began a binational geologic compilation and integration of project study Subarea 7, which extends from Falcon Reservoir to Amistad Reservoir, Texas;

5) Soil Moisture Research: a) continued soil moisture research and modeling, which forms the basis of risk mapping for potential mosquito breeding habitats and spread of vector-borne disease. The soil moisture research is in progress and results will be used to complete the final (Version 2); bi-national geologic map for Lower Rio Grande Valley with permeable and impermeable units added to the Beaumont Formation and Rio Grande deposits on both sides of the border; and b) preparation of an abstract on soil moisture modeling for USGS Symposium on Earth Science and Public Health;

6) Geochemistry Research: continued work analyzing the mineralogy and chemistry of soil samples from the Brownsville-McAllen area, and presented results at Geological Society of America Annual meeting in Philadelphia, Pennsylvania, in 2006. Began preparation of a manuscript summarizing the environmental geochemistry of the Lower Rio Grande Valley area, and U.S. Geological Survey open-file reports of geochemical and mineralogical results.

Outreach about the BEHI and technical information was provided through: **1)** a poster presentation at the IV World Water Forum, Mexico City; **2)** presentation of BEHI Project at Tri-National Meeting of the Servício Geológico Mexicano, Geological Survey of Canada, and U.S. Geological Survey, and Geological Society of America Annual Meeting, Salt Lake City, Utah, October, 2005; **3)** 2 presentations about the BEHI at the Mexican National Geography Conference in Monterrey, Mexico; **4)** 4 presentations at the Geological Society of America South Central Section Annual Meeting, Norman, OK; **5)** a presentation at the Association of American Geographers meeting, Chicago, IL ; **6)** publication of an article in the on-line Global Spatial Data Infrastructure newsletter for Latin America; **7)** an invited academic visit to the Universidad Autonoma de Nuevo Leon by Texas Water Science Center and Geography employees; 8) an invited article published by the BEHI co-PIs in PEMEX's (Petroleos Mexicanos) in-house journal el Boletín about the BEHI; **9)** an invitation to write an article for INEGI's journal (due October 2006); **10)** abstract accepted for presentation at the Global Spatial Data Infrastructure meeting to be held November (2006); and **11)** a presentation at the Border 2012 National Coordinators meeting in Ensenada, Mexico.

Sought funding and collaborative opportunities for projects to demonstrate application of the BEHI and to continue to further develop datasets for the BEHI **1)** through the International Boundary and Water Commission (IBWC). Three reimbursable projects are being funded in 2006 and 2007– a) binational hydrography network model for all the watersheds along the U.S.-Mexico border, beginning in the West and working towards Texas, b) new border image maps for the Texas/Mexico border, and c) a dedicated Internet Map Service for water monitoring stations along the border; **2)** through the Geology Group's successful negotiation of FY 2007 funding from the USGS Cooperative Geologic Mapping Program for further program development to define detailed geologic mapping activities along the border. The Geology Group is currently negotiating potential funding from NORTHCOM to address National Security issues along the US-Mexico Border; **3)** by providing information for Congressional testimony presented by Pat Leahy for the "U.S.-Mexico Border Transboundary Aquifer Assessment Act" (May 2006) that noted that the BEHI project was a foundation for the future study of transboundary aquifers; **4)** through dialogues with PEMEX which is interested in our participation with their GIS development and evaluation of gas projects in the Burgos Basin. This work would provide much needed Mexican data relative to existing and future contaminant issues in the Lower Rio Grande Valley area. Project team members met with PEMEX and the director of UNAM's Programa Universitaria del Medio Ambiente (PUMA), a potential collaborator on the Burgos project, in Mexico City. Negotiations for our participation are on-going, but a project is expected in 2007; **5)** from the Commission on Environmental Cooperation (CEC) to fund a border map of potential targets of Avian Flu and at the request of the USFWS provided a presentation on the Border Health project and the Avian Flu proposal to the Tri-lateral Committee and CEC delegates May 15-17 (well-received but unsuccessful at receiving funding); **6)** from EPA's Border 2012. Border 2012 requested and was provided border maps and a BEHI

representative attended their March 2006 meeting to investigate funding and collaborative project opportunities; **7)** through discussions with INEGI, USGS Geography, and Natural Resources of Canada. Previous BEHI supported research on land cover change techniques for the Lower Rio Grande Valley, has stimulated interest among these partners to build a North American Land Cover map. This work would support land cover change research along the entire border; and **8)** through submission of a proposal to USGS, GIO, Center of Excellence for Geospatial Information Science in answer to their request for proposals to address critical geographic information science questions of importance to the USGS and to the broader geospatial community in FY 2007.

The BEHI was included as a science pick for the USGS.

Briefed the Central Executive Leadership Team on the BEHI project.

2.) PROJECT WORK PLAN FOR FY 2007: In FY 2007 our efforts will continue to build on the now established border-wide base map on the IMS, especially west of Texas. In these areas, we will add specific, local-level datasets such as land use and land cover, hydrography, water quality, aquifer characteristics, demographics, potential sources of contaminants and contaminants in biota. Binational seamless integration methodologies, now well-developed from our work along the Rio Grande in Texas, will be used to build integrated datasets. Data identification for these tasks will be accomplished in part by local subject matter specialists (USGS) with BEHI support. In addition to adding data layers to the western Subareas, we will continuously update the Texas Subareas with new data layers as they become available. The BEHI team will also be working on the reimbursable IBWC modeling and mapping projects along the border which will provide additional data layers for the IMS. A primary focus in FY 2007 is to partner with the Pan American Health Organization's US-Mexico Border Field Office. We will collaborate on a project that takes advantage of datasets (e.g., contaminants, water quality) already compiled under BEHI to relate environmental quality in south Texas to a human health concern(s). The BEHI and PAHO teams currently have 2 or 3 potential projects under consideration of which 1 or 2 will be selected. In addition, the BEHI team will work with PAHO's clinicians along the border through GIS training workshops. These workshops will provide the much needed and requested extensive GIS expertise of the USGS but more importantly will provide an excellent opportunity for BEHI PIs to learn first-hand the issues border health care providers are addressing so that BEHI can better meet these needs through geospatial data. As in FY 2006, the BEHI team will continue to seek collaborative opportunities along the border to apply BEHI data and expertise. A comprehensive Work Plan for FY 2007 will be forthcoming.

FY 2007 PROJECT BUDGET REQUEST: The FY 2007 budget request is $500,000.

	Biology	Geography	Geology	Water
Salary	$85,500	$98,500	$98,780	$85,500
Travel	$10,000	$12,000	$11,720	$10,000
Data Purchase and IMS Hosting	$6,000	$6,000	$6,000	$6,000
Stakeholder Meetings	$1,500	$1,500	$1,500	$1,500
Publications	$500	$500	$500	$500
Cooperative Agreements	$20,000	$5,000	$5000	$20,000
Funding Distribution	$123,500	$123,500	$123,500	$123,500

3.) COLLABORATIONS, MEETINGS, AND TECHNICAL TRANSFER ACTIVITES

Met several times with the Pan American Health Organization (PAHO) for discussions directed at developing projects in 2006-2007 of mutual interest using BEHI datasets and PAHO border human health data to define linkages between human health and environmental conditions along the U.S.-Mexico border and attended the Health Resources and Services Administration (HRSA) meeting August 2006 in Tucson to further our knowledge of human health issues on the border. One or two projects will be selected for 2006-2007 from four project briefs provided to PAHO.

Provided digital U.S-Mexico International Boundary line data to the U.S. Department of State (DOS) and National Geospatial-Intelligence Agency (NGA). Participated in conference calls and an onsite meeting with DOS and NGA to discuss the availability of binational data along the border, desired accuracy and completeness of the digital international boundary line, and delegation of work.

Team members met with Dr. Carmen Reyes and some of her staff of Centro-Geo, a Mexican an independent and non-profit research and educational organization, supported by the Mexican National Science Foundation to discuss collaboration on participative cyber cartography projects along the U.S.-Mexico Border.

Team members provided a WebEx demonstration to the Mexican University for Web Development (CUDI) Internet 2 research organization on the status of the project and use of Internet technology to provide geospatial data over the web.

Team members presented a short course at the IV World Water Forum in Mexico City. Over 18,000 water specialists attended the Fourth World Water Forum, which featured 5 days of scientific lectures and discussion and several hundred exhibits from international programs, national agencies and private sector developers. Among other topics the scientific sessions dealt with science and technology, risk management and governance.

BEHI PIs were requested to peer reviewed the EPA's State of the Border Region Indicators Report 2005 for the Border Indicators Task Force. The review entailed evaluating the indicator materials according to the charge questions and preparing and submitting individual comments.

4.) BIBLIOGRAPHIC UPDATE

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5.) ACKNOWLEDGEMENTS / TESTIMONIALS: During the various presentations at conferences and rollouts, members of public works, academics, and U.S. and Mexican government agencies have been very complimentary of work done on the Environmental Health Initiative.

Dr. Christopher Brown, Assistant Professor of Geography at New Mexico State University and SCERP member:

> "Based on the progress to date and the excellent working relationships we are building with members of the Project Team, the prospects for successful completion of the project continue to be very high. We are especially heartened to have connected so well with stakeholders at the USGS (Jean Parcher and Jim Stefanov) who are driving the U.S-Mexico Border Environmental Health Initiative Project, and we are thrilled to have the signed MOU in place by which this collaborative work will proceed. We are already seeing excellent results collaborating with USGS staff on accessing GIS data needed to support NMSU's USGS/SCERP GIS Data Node, and we have every expectation that this relationship will prove to be highly fruitful in the future." Source: http://www.scerp.org/new/complete_bull.asp?IdBol=37

Statement of Dr. P. Patrick Leahy U.S. Geological Survey, U.S. Department of the Interior before the Committee on Resources Subcommittee on Water and Power U.S. House of Representatives

on S.214/H.R. 469, "United States-Mexico Transboundary Aquifer Assessment Act":

> "The proposed investigations and pertinent research efforts authorized by S. 214 and H.R. 469 would address critical water, environmental, and health issues in the Border region and contribute to a more comprehensive understanding of the relations between the region's many water, natural-resource, biological, and health-related issues. It is important that a bi-national, multi-discipline scientific approach be taken to address these interrelated issues. Additionally, these binational studies would develop and document the tools, methodologies, and procedures to collect and integrate hydrologic, biologic, and other spatial data into the USGS Border Environmental Health Initiative geographic information system for analysis and modeling applications. Thank you, Mr. Chairman, for the opportunity to present this testimony. I will be pleased to answer questions you and other Members of the Subcommittee might have." Source: http://www.doi.gov/ocl/2006/S214and%20HR469.htm

Comments after a meeting with the Department of State Geographers, National Geospatial-Intelligence Agency, U.S. Border Patrol and U.S. National Guard:

> " It's amazing to realize that your environmental health project has the most up-to-date and accurate U.S.-Mexico international boundary line of all the entities present in the meeting."
>
> Source: John Kelmelis, Ph.D. USGS Geographer on loan to the Department of State, 202 647-3801

From an e-mail request:

> "You responded to an e-mail I sent regarding the US-Mexico border. My wife Laurel and I are consultants working on a FEMA grant to reduce the risks from a broad range of hazards along the border. Therefore our interest is not directly concerned with health issues. However, we would be most interested if you have studies, analysis, or any other information related to hazards that might jeopardize health in that region, such as polluted water, hazardous material dumps, etc." Source: Larry W. Lacy, Ph.D., H2O Partners, Inc, 512-261-0705

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